

Remarks

A Declaration by Michael Pittroff has been submitted along with this response.

The claims have been amended to more particularly point out that which applicants regard as their invention. Support for the claim amendments is found, *inter alia*, in Examples 1 and 2 and in the drawing figure, as well as in the original claims.

Please cancel claim 2.

Claim 5 was objected to as indefinite under 35 USC §112, second paragraph. Claim 5 has been amended to clarify the claim language.

The rejection of claims 1, 3 - 4, and 10 - 13 under 35 U.S.C. §103(a) as being unpatentable over Li et al., US 5,785,741 in view of Sanders, Jr., et al., US 4,838,904 and Li et al., US 5,855,647 is also respectfully traversed.

Li et al., '741 teaches treatment of perfluorocompound-containing effluent gases from semiconductor manufacturing processes in membrane separators to obtain perfluorocompound mixtures. As acknowledged in the Office Action, Li et al., '741 fails to disclose both the specific feed composition required by claims 1, 3 - 4, and 10 - 13, and the specific separation membrane recited in claims 1, 3 - 4, and 10 - 13. Additionally, Li et al., '741 wholly fails to describe the collection of an SF<sub>6</sub>-enriched retentate as claimed, and there is especially no disclosure of a highly concentrated SF<sub>6</sub> retentate as required by dependent claim 12. Moreover there is

absolutely no disclosure or suggestion of the specific feed pressures of 10 to 13 bar required by the claims.

The deficiencies of Li et al., '741 are not rectified by the secondary references. Although Sanders, Jr., et al. does disclose the type of membrane recited in claim 1, it is significant that it describes it as useful to separate O<sub>2</sub> from N<sub>2</sub>, with N<sub>2</sub> being the **retentate**. In fact, Sanders, Jr. et al. does not provide any examples of a separation where N<sub>2</sub> is the permeate. Thus, Sanders, Jr. et al. teaches away from the present invention which requires use of a membrane that preferentially passes N<sub>2</sub> and the formation of an N<sub>2</sub> enriched permeate.

Additionally, Sanders, Jr. et al. does not disclose separation of SF<sub>6</sub> from N<sub>2</sub>. Thus, Sanders, Jr., et al., also does not disclose the volume percentages of N<sub>2</sub> in the enriched permeate and SF<sub>6</sub> in the enriched retentate as recited in claims 10 – 12. Paragraph 9 of the Office Action asserts that the mere disclosure of the membranes in Sanders, Jr. et al., in combination with Li, et al., '741, is sufficient to render these claimed limitations obvious. However, a process according to claims 10 or 11 that results in the claimed N<sub>2</sub> permeate percentages of claims 10 – 11 is not disclosed or suggested in any combination of the cited references. Similarly, a process according to claim 12 that results in the claimed SF<sub>6</sub> retentate percentages is not disclosed or suggested in any combination of the cited references. As a result, the Office Action fails to make a proper, *prima facie* case of obviousness. If the Office Action is attempting to assert that the permeate and retentate percentages recited in claims

10 – 12 are inherent to the use of the claimed membrane, a reference demonstrating this is requested.

Li et al., '647 likewise fails to compensate for the deficiencies of the primary reference. The Office Action states that the Li et al. discloses an admixture of  $N_2$  with up to 20%  $SF_6$ . However, in the three specific examples provided in Li et al., '647, the initial  $SF_6$  concentration is never higher than 0.12% by volume. (Li et al., '647, Col 9, line 30 – Col 10, line 64) Additionally, Li et al., '647 exemplifies feed pressures from 3 to 9 bar, which lie outside applicants' claimed range of membrane feed pressures. Due to the risk of damage to the glassy membranes used in applicants' claimed process, it would not be obvious to one of skill in the art to operate the systems described in Li et al., '741 or Li et al., '647 at increased pressures.

The importance of the membrane feed pressures and initial  $SF_6$  concentrations of the claimed invention is further demonstrated by the Declaration by Michael Pittroff submitted along with this response. The Declaration contains the results of experiments involving separation of  $SF_6$  from an  $SF_6/N_2$  mixture using the apparatus of the claimed invention. When the apparatus of the claimed invention is operated with an initial  $SF_6$  concentration of 5% and a membrane feed pressure of 5 bar, no  $SF_6$  separation occurs at any of the experimental flow rates. Thus, a condition well within the range of operating conditions taught by Li et al., '647, but outside of the operating range of the claimed invention, does not result in separation of  $SF_6$  using the membrane of the claimed invention. By contrast, when

the membrane feed pressure is increased to values similar to the 10 – 13 bar of the claimed invention, separation of SF<sub>6</sub> begins to occur at all of the studied flow rates. In other words, the claimed ranges of Applicants invention are not merely optimizations of result-effective variables. Rather, Applicants have discovered the necessary conditions for operation of the claimed invention.

For the above reasons, the cited references fail to make out a proper, *prima facie* case of obviousness, and reconsideration and withdrawal of the rejection of claims 1, 3 – 4, and 10 - 13 are respectfully requested.

The rejection of claims 5 and 6 over the combination of Li et al., US 5,785,741; Sanders, Jr., et al., US 4,838,904; Li et al., US 5,855,647 and Tamata et al., US 6,004,377 is also respectfully traversed.

The deficiencies of Li et al., '741, Sanders, Jr. et al., and Li et al., '647 are described above. Tamata et al. fails to make up for these deficiencies in the other references. Even assuming *arguendo* that applicant's claimed gas insulated line can be considered a gas insulated "machine" as described by Tamata et al., Tamata et al. does not compensate for the above-noted failures of the other references to place a person of ordinary skill in possession of applicants' claimed invention. Thus, the cited references fail to make out a proper, *prima facie* case of obviousness, and reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claim 7 under 35 USC §102(e) over Tamata et al. is respectfully traversed. Claim 7 as amended recites a gas insulated line containing a mixture of SF<sub>6</sub> and N<sub>2</sub> with an initial SF<sub>6</sub> content of from 5 to 50 volume-%. Claim

7 as amended also recites delivering the mixture to said membrane separation stage at a membrane feed pressure of 10 to 13 bar. These limitations are not disclosed by Tamata et al. Reconsideration and withdrawal of this rejection are respectfully requested.

The rejection of claim 8 under 35 U.S.C. §103(a) as being unpatentable over Tamata et al. in view of Sanders, Jr. et al. is also respectfully traversed. As described above, Tamata et al. does not disclose a system as presently claimed having a gas insulated line containing a mixture of SF<sub>6</sub> and N<sub>2</sub> with an initial SF<sub>6</sub> content of from 5 to 50 volume-%, wherein the mixture is delivered to said membrane separation stage at a membrane feed pressure of 10 to 13 bar. Sanders, Jr. et al. does not address this deficiency. Reconsideration and withdrawal of the rejection of claim 8 are respectfully requested.

The rejection of claim 9 under 35 U.S.C. §103(a) as being unpatentable over Tamata et al. in view of Li, et al., '741 is also respectfully traversed. As described above, Tamata et al. does not disclose a system as presently claimed having a gas insulated line containing a mixture of SF<sub>6</sub> and N<sub>2</sub> with an initial SF<sub>6</sub> content of from 5 to 50 volume-%, wherein the mixture is delivered to said membrane separation stage at a membrane feed pressure of 10 to 13 bar. Li, et al. '741 does not address this deficiency. As such, reconsideration and withdrawal of the rejection of claim 9 are respectfully requested.

The rejection of claim 7 under 35 USC §102(e) over Tamata et al., US 6,004,377, is respectfully traversed. Tamata et al. discloses a system using filters filled with adsorbents to remove impurities from SF<sub>6</sub>. In the fourth embodiment, found at col. 13, line 38 – col. 14, line 57 and depicted in Figs. 7 and 8, Tamata et al. discloses a system for collecting SF<sub>6</sub> and other gases in which a gas mixture from a gas insulated machine is passed successively through first and second adsorbent filters 4 and 8, a zeolite molecular sieve third filter 9, and a porous film fourth filter 30. Tamata et al. does not disclose a system as presently claimed in which a gas insulated line is connected directly to a membrane separation stage by a connecting line.

The Examiner notes that the specification as filed describes alternative embodiments of the invention where purification of the gas mixture is performed prior to the gas mixture arriving at the membrane separation stage. These alternative embodiments are not relevant for the interpretation of the term "direct" in claim 7. Rather, claim 7 should be interpreted in accordance with its plain meaning as it would be understood by those skilled in the art. (MPEP §2111.01; *In re Sneed*, 710 F.2d 1544, 218 USPQ 385 (Fed. Cir. 1983).) The plain meaning of claim 7 does not include embodiments involving a purification of the gas mixture after leaving the gas insulated line and prior to reaching the membrane separation stage. Additionally, the specification does not provide a separate definition or some other sufficiently clear indication to one of skill in the art that the term "direct" should be assigned a special meaning. (MPEP §2111.01; *Multi-form Desiccants Inc.*

*v. Medzam Ltd.*, 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998).) As a result, Tamata et al. does not anticipate the plain language of claim 7 as Tamata et al. does not disclose a system as presently claimed in which a gas insulated line is connected directly to a membrane separation stage by a connecting line. Therefore, reconsideration and withdrawal of the rejection of claim 7 are respectfully requested.

The fact that N<sub>2</sub> may be smaller than SF<sub>6</sub> does not mean that a person of ordinary skill would necessarily expect that the membrane would preferentially pass N<sub>2</sub>. O<sub>2</sub> also is heavier than N<sub>2</sub>, and yet according to Sanders, Jr., et al. O<sub>2</sub> preferentially passes through the membrane. Sanders, Jr., et al. simply fails to describe the preferential passage of N<sub>2</sub> to form an N<sub>2</sub> enriched permeate as claimed.



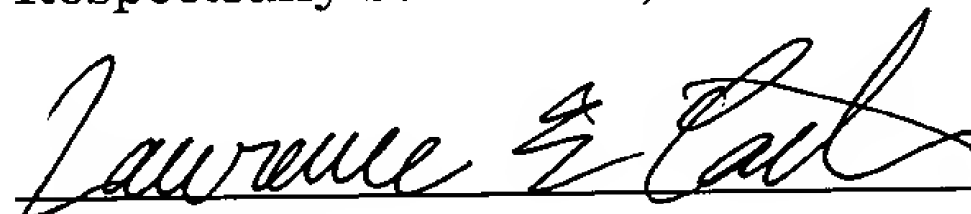
In view of the foregoing amendments and remarks, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #173/50483).

July 28, 2003

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Lawrence E. Carter", written over a horizontal line.

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